Management of the Clinch River Trout Fishery

This document was created by TWRA to report results of existing management efforts and to request help in developing the next plan. Please send your comments to twra.clinch@state.tn.us or TWRA Fisheries – Clinch River, PO Box 40747, Nashville TN 37204.

Since 2002, the Tennessee Wildlife Resources Agency has been managing the Clinch River trout fishery according to a written plan, called Management Plan for the Norris Tailwater Trout Fishery 2002-2006. This plan was written by biologists with the understanding that anglers expected more and bigger trout in the Clinch River.

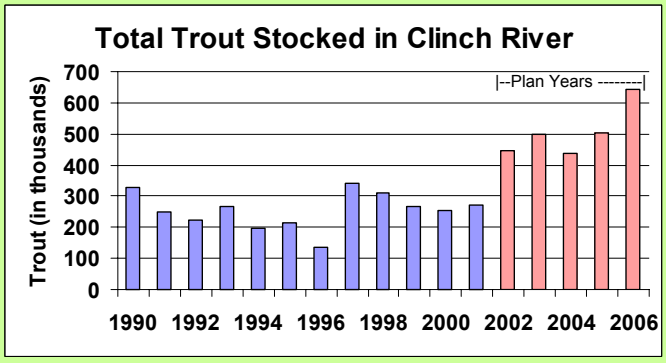
Table 1. The objectives of the 2002-2006 plan were to increase trout abundance by 25 %.

	2000-2002 Average (fish/hour)	Objective (fish/hour) By 2005	By 2006
Trout > 7 inches	161	200	200
Trout > 14 inches	24	30	30
Trout > 18 inches	6.4	--	8

The objective of this plan was to increase the abundance of trout by 25% by 2005 (Table 1). This 25% increase was based on the average number of fish collected per hour by electrofishing during the three years prior to the plan's development (2000-2002). These years were chosen because they represented some of the highest abundances on record, therefore TWRA considered these to be ambitious objectives. Due to high variability in catch data for trout larger than 18 inches, biologists realized that this objective would be difficult to evaluate, but included it anyway to reflect the fact that our goal was to increase the abundance of these larger fish as well.

Several management options were considered in 2002, including stocking and various fishing regulations. TWRA chose to annually stock additional fingerling (small) trout for three reasons: 1) trout populations did not appear to be at capacity (i.e. fish exhibited good growth rates); 2) past fingerling stockings were successful; 3) TWRA's Eagle Bend Hatchery was able to produce the additional fingerlings. Other management strategies continued (i.e. provide access, enforcement, etc.) but the stocking of additional trout was the major change.

Figure 1. Annual trout stocking.



TWRA successfully stocked additional fingerling trout (Figure 1). Most of these trout were about 1-2 inches long, but additional larger fingerlings (3-5 inches) were stocked when surplus fish were available.

Each year in February or March, TWRA evaluated the progress of the plan by electrofishing to estimate the abundance of trout, measured in fish per hour.

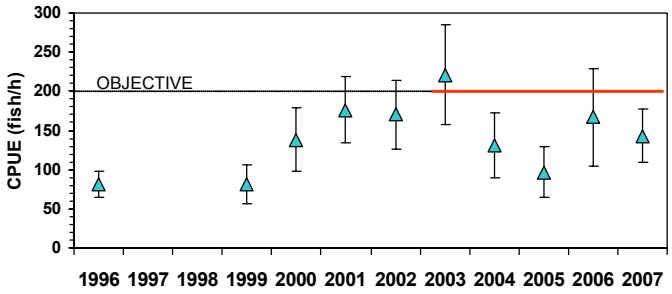
Throughout the evaluation period, which continued into February 2007, rainbow trout were typically more abundant than brown trout at sizes less than 18 inches, but there were always more brown trout than rainbow trout in the > 18 inch category.

Abundance of trout > 7 inches varied throughout the plan period and the objective was only met in 2003 (Figure 2).

Abundance of trout > 14 inches increased steadily from 2002 to 2004 and then declined through 2007 (Figure 3). The objective for trout > 14 inches was met in 2003, 2004 and 2006.

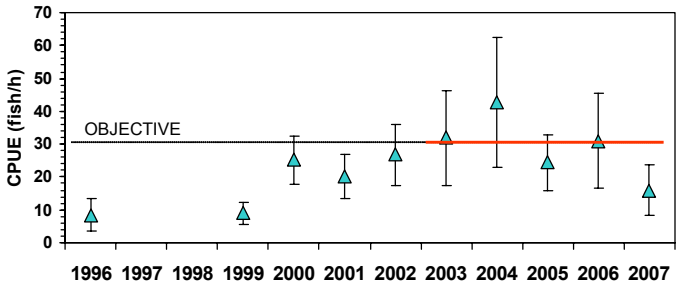
Although the abundance of trout >18 inches did exceed the objective by 2006 (Figure 4), biologist have less confidence in these data due to high variability. Note the large size of the vertical bars which represent variability in these estimates.

Figure 2. Evaluation of trout > 7 inches



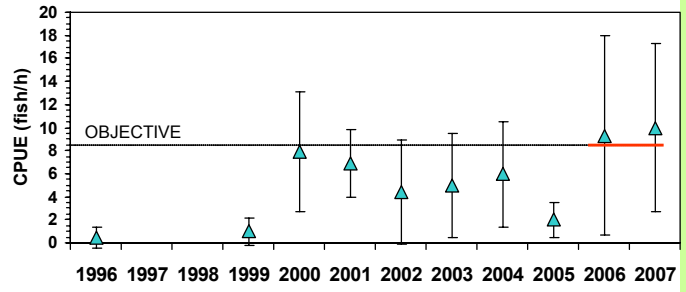
Triangles represent mean trout abundance. Vertical bars are 90% confidence intervals, an expression of variability.

Figure 3. Evaluation of trout > 14 inches



Triangles represent mean trout abundance. Vertical bars are 90% confidence intervals, an expression of variability.

Figure 4. Evaluation of trout > 18 inches



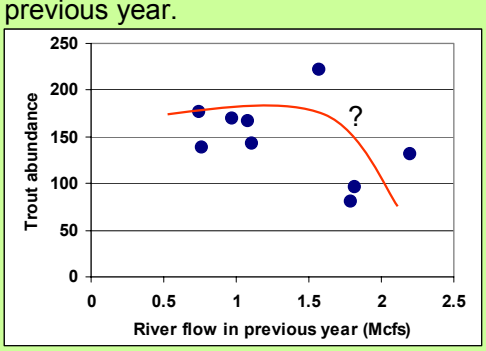
Triangles represent mean trout abundance. Vertical bars are 90% confidence intervals, an expression of variability.

In an attempt to explain the variation in abundance among years biologists evaluated a variety of data collected since 1999 to determine which factors are most affecting trout abundance. What follows are some trends that they observed in the data:

1) Surprisingly, abundance of trout > 7 inches was not strongly related to the number of trout stocked.

2) River flow varied considerably throughout the course of the plan. Although this relationship is not completely understood, abundance of trout > 7 inches appeared to be negatively affected by high river flows (Figure 5). This may explain why the stocking rate was not strongly related to abundance.

Figure 5. Trout abundance versus river flow in previous year.



3) Abundance of trout > 14 inches was positively related to abundance of trout > 7 inches the previous year. This is a normal relationship in a population where fish are growing and surviving to larger sizes. In other words, there was not a bottleneck that limited growth from 7 to 14 inches.

4) Biologists also monitored weight of trout. Obviously weight increases with fish length, but when adjusted for fish length and species, weight is used to describe how fat or skinny they are as individuals. This measurement is known as a relative weight (Wr). As populations, Wr did not substantially vary among years for either species, and did not appear to be linked to trout abundance or stocking rates. There was no evidence of over-crowding.

5) There was a striking difference between Wr of rainbow and brown trout populations. The Wr of brown trout improved with length, whereas Wr of rainbow trout decreased with length. This means that larger brown trout are finding enough food to get fat, while the larger rainbow trout are not. Biologists attribute this pattern to differences in feeding behavior. Brown trout are successful at supplementing their diet with fish (including small trout), while rainbow trout are known to relying heavily on insects even at larger sizes. Even in the Clinch River where insects are abundant, it still takes considerably more effort to consume enough insects to stay fat and healthy.

6) In 2004-2005 Didymo, an invasive alga, rapidly colonized large reaches of the Clinch River. Biologists are concerned that dense colonies of didymo on the river bottom could harm this fishery. While trout abundance is generally lower since didymo invaded, biologists are cautious to blame didymo for two reasons: 1) macroinvertebrate (insect) data collected by TVA shows no decline in abundance

or species composition, meaning that food is still available; 2) the South Holston and Watauga rivers have abundant didymo and very high abundances of trout compared to pre-didymo years.

7) Angler surveys were conducted in 1996, 2001, and 2005. Fishing pressure (hours fished) was essentially the same in all three surveys, with 16-17% using flies and 66-73 % using bait. The catch and harvest data was typical for Tennessee tailwaters. The only substantial differences among these years were a low harvest rate (0.6 trout/hour) in 2001, and a really high catch rate (7.2 trout/hour) in 2005. Despite a two-fold difference in harvest rates between 2001(0.6 trout/hour) and 2005 (1.2 trout/hour), we observed similar increases in abundance following both years. The relationships between harvest and resulting abundance of trout the following year is not clear as too few data points (n=2) are available.

8) Several of the above factors are likely working in combination, possibly with unidentified factors, to create variability that we cannot explain at this time.

Conclusions

The objectives of the 2002-2006 plan were not consistently met. While additional stocking did not appear to harm the fishery, it did not have the desired effect of increasing trout abundance by 25%. Monitoring efforts identified high flows as a factor that contributed to the failure of this plan.

What's Next

1. Request suggestions from anglers to establish goals for next plan through June 1, 2007.
2. Develop a draft plan to meet these goals by the July 2007 TWRC (TN Wildlife Resources Commission) meeting.
3. Between July and October 2007 TWRC meetings, accept public comments on the draft plan.
4. In October, present a draft plan and overview of comments to TWRC for approval.
5. Using TWRC recommendations complete final draft by December 2007.

Help TWRA develop the next plan:

TWRA will develop the next Clinch River Management Plan (2008-2012) to reflect the public's goals for this fishery. What are your goals for the river?

Please send your comments to twra.clinch@state.tn.us or TWRA Fisheries – Clinch River, PO Box 40747, Nashville TN 37204. TWRA may need to contact you, so please include your name and contact information with your comment. Deadline for comments is June 1, 2007.